

Collecting water samples remotely... Suction Lysimeter Probe

The Suction Lysimeter Probe remotely collects water samples from saturated and unsaturated underground areas. It is one of several probes at the INEEL inserted directly into contaminated wastes to monitor, sample and detect environmental conditions. The data it provides, combined with other probe data, can significantly influence environmental investigations and impact cleanup decisions.



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This INEEL-developed Suction Lysimeter Probe retrieves water samples without exposing workers or impacting the environment.



PN01-391-5-22

Why the need for this probe

The INEEL Environmental Restoration Program needed to determine whether contaminants from buried wastes are mobile and being transported toward ground water, and to identify soluble contaminants and their concentrations.

What the probe does

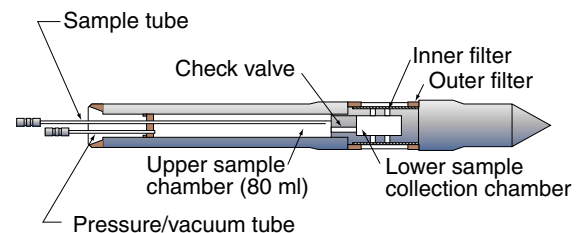
Once inserted into the ground, the INEEL-developed Suction Lysimeter Probe remotely draws soil water samples into the probe through its designated porous section. Water samples can be collected in saturated or unsaturated conditions for chemical analysis. Pressurized transfer lines remotely move water samples from the probe to a sample retrieval system on the land surface.

Probe and operation description

The Suction Lysimeter Probe was designed to be an integral part of a probe casing that is driven through soil and waste to a desired depth. At the INEEL, the depth to the interface between the waste zone and the underburden varies to 25 feet deep. After installation, probe connections are capped-off inside a protective box at the land surface, where water sample ports can be easily accessed at any time. The probe has multiple barriers to prevent contamination from reaching the surface.

The Lysimeter's instrument is about two and a half inches in diameter and thirty inches long. The four-inch long sampling section of the probe is made of porous stainless steel and is attached to the probe tip. The porous sampling section of the probe allows a

pathway for water and contaminants to pass from the surrounding soils into a chamber in the probe's tip while not allowing air to pass through the porous stainless steel. A tube containing a check valve connects the water sample chamber to a reservoir. Two tubes from this reservoir are connected to the sample collection system at the land surface. One tube is used to draw a vacuum that causes water to fill the reservoir, and another tube pressurizes the reservoir chamber that closes the check valve and transfers the water in the reservoir to the sampling station.



The Suction Lysimeter Probe makes it possible to remotely retrieve water samples from any desired depth.

The amount of water collected and the collection time depend on several factors, including the soil's ability to conduct moisture, the amount of moisture available, the flow of moisture through the Lysimeter's porous section, and the level of vacuum applied to sample lines.



Obtaining representative information on contaminated subsurface water requires sampling at various locations and depths. At the INEEL, these probes are generally placed as close as possible to vertical horizons that are likely to provide representative samples.

Retrieving water samples

A custom-designed glovebag encloses the sampling station that is positioned near the probe's access box at the land surface. The station is designed to be highly portable and maintains sample integrity while preventing the spread of contaminants that may be contained in the water samples. The glovebag protects workers and the environment by effectively isolating samples during extraction activities.

If there is uncertainty about the presence of radionuclides in the samples, the first round of analysis assesses radionuclide content. After determining radiological content, samples may be sent to approved laboratories for further chemical analysis and identification of contaminants and their concentrations.

Data results

The analytical results provided by a laboratory confirm that sufficient water is available in the vadose zone to allow sample collection, that soil water pressure can be determined and can be correlated to moisture content, and that specific contaminants are present in water at known concentrations.

Benefits

Water quality data obtained as a result of using the Suction Lysimeter Probe include the following:

- Detects presence of water at a specific locations
- Determines through sample analysis whether leaching occurs
- Defines the source materials that leach
- Indicates whether leaching increases or decreases over time
- Provides analytical data to calculate the effects of water infiltration and the potential for contaminant migration
- Minimizes generation of waste by leaving instrumentation in place
- Reduces uncertainty in risk assessment calculations that influence decisions.



This portable sampling system protects the quality of samples and protects workers and the environment from exposure.

Points of contact

To discuss how the Suction Lysimeter Probe might apply to your needs, contact **Andy Baumer**, or one of the other references at the phone or e-mail address shown. The INEEL's **Technology Catalog** is another reference on new and innovative technologies. It's on the web at tech.inel.gov.

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